DP-IR™

Detecto Pak-Infrared

User's Manual

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Heath....Leadership, Innovation, Performance
Then, Now and Tomorrow

Notice

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Detecto Pack - Infrared™ and DP-IR™ is a **HEATH** registered trademark.

The DP-IR is protected by patents and patents pending.

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Warnings:

It is essential that users of this instrument read, understand, and follow the instructions for operation and maintenance, and the precautions contained in this manual, to insure that the instrument is used in a proper and safe manner. For potential situations where injury may occur to the operator or damage to the instrument, a warning enclosed in a box will be shown to alert the operator.

****Warning****

Perform any and all maintenance in a location known to be non-hazardous.

****Warning****

To reduce the risk of ignition of a flammable or explosive atmosphere, batteries must be changed or recharged only in a location known to be non-hazardous.

****Warning****

No attempt should be made to repair the instrument. Should the instrument not work properly, or indicate an error or warning, refer to the troubleshooting section of this manual.

****Warning****

Substitution of Components May Impair Intrinsic Safety. No user serviceable components contained within this instrument.

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Overview

The **HEATH** Detecto Pak-Infrared (DP-IR™) uses a highly advanced optical technology capable of detecting methane gas utilizing the Infrared Controlled Interference Polarization Spectrometry method. The DP-IR is the latest of a new generation of leak survey instruments from **HEATH** that will greatly improve the productivity, cost and safety of walking and mobile surveys.

The DP-IR functions by using an infrared optical gas detection system. This instrument is intended to replace the current surveying equipment using the traditional Flame Ionization method with next generation technology utilizing an infrared light beam, eliminating the need for expensive gas cylinders and refill systems. It is designed to be highly selective to detecting methane gas only, and will not false alarm on other hydrocarbon gases.

Figure 1: The DP-IR uses advanced infrared optical technology to achieve high sensitivity to methane gas.

The DP-IR operates under a variety of field conditions including cold and hot temperatures. Its rugged design will stand up to normal field use and operating conditions.

The DP-IR has a built-in Self-test function that will verify the instrument is operating properly. Using the internal calibration cell, the operator performs the self-test as part of a daily start-up routine. While in operation, the DP-IR continuously monitors several internal parameters to ensure that it is functioning properly. Should any of these parameters go outside of operational limits, a constant audible alarm will sound and an ERROR icon will be displayed.

Chapter I
DP-IR System Specifications

Detection Method:	Infrared Controlled Interference Polarization Spectrometer	
Measurement Range:	0-10,000 PPM 0-100%Gas	
Display Range:	Auto Ranging: PPM: 0-10,000 %Gas: 1-100%	Manual Ranging: PPM scale: 0-10,000 %Gas: 0-100%
Sensitivity:	0-1000 PPM: 1 PPM 1000-10,000 PPM: 5 PPM 1-100%Gas: 0.5%	
Accuracy:	+/-10% of reading (typical, std conditions)	
Detection Alarms Modes:	Digital Methane Detection (DMD): Audible tone when detection threshold is exceeded. Adjustable Alarm Level from 1 to 9000 PPM Tick: Continuous audio tone relative to concentration	
System Fault Warning:	Audible tone and indication on the display	
Self Test & Calibration:	Built in Self Test and Calibration function verifies operation and adjusts calibration for maximum sensitivity. Test gas cell integrated within the instrument.	
Compliance:	EN 61326-1 Conducted Emissions Class B Radiated Emissions Class B ANSI C63.4 Class B FCC 47 CFR Part 15 Class B	 EN 61326-1 EN 61000-4-2 4kV/8kV EN 61000-4-3 3 V/M
Dust filter:	Replaceable filter provide dust protection. Easy change out quick disconnect filter cap.	
Display:	Large easy to read backlit LCD (.75” Numeric)	
Operating Temperature:	0 to + 122 F (-17 to 50 C)	
Humidity:	5 to 95 % RH, non-condensing	
Enclosure:	IP54 (Water splash and Dust resistant)	
Instrument Weight:	5.6 lbs.	
Carry Case:	13 lbs empty; 21lbs filled 24.5” x 21” x 9”	
Power Supply:	Internal rechargeable Li-ion battery or External 12vdc car battery with optional power conditioner	
Battery Operating Life:	8 hours at 32 F with out backlight on	
Battery Charger:	External, in-line, 110 - 240 VAC, 50 / 60 hertz. 6 hours maximum to full charge	
Shoulder Strap:	Single over the shoulder padded strap	
Speaker Volume:	108 dBs @ Alarm port (A-fast)	
Survey Probe:	Quick connect fitting with locking clasp. Adjustable length from 25” to 41”	
Bar hole Probe:	Std: 20”; Optional 36”	
Intrinsic Safety: TBD:	UL Class 1 Zone 1 Aex ib IIA T3	

	EX II 2 G EEx ib IIA

DP-IR System Components

This Chapter describes the features of the DP-IR. Please refer to **Figure 2** for illustrations of individual parts.

Figure 2: System Components

Instrument

This is the primary component of the DP-IR surveying system. In addition to the gas detection capability, it contains the user interface, data logging interfaces, power connector, and the surveying probe connection.

Carrying Strap

The DP-IR has a detachable hand strap secured to three mounting points on the instrument. There is also a padded shoulder strap to accommodate different caring preferences.

Battery Charger

The battery charger is provided to recharge the instrument after use. The charger is a universal 110 - 240 VAC, 50 / 60 hertz with a charging indicator. Universal adaptors are provided to convert the style plug for different types of receptacles.

Instruction CD

The Instruction CD contains the following items:

1. This Instruction Manual, which provides instructions on the uses and operation of the instrument.
2. Additional **HEATH** product information.
3. **HEATH** contact information.

Carrying Case

The carrying case provides protection for the instrument during storage or transportation. The instrument should be kept in the case while not in use.

Bar Hole Probe

The Bar hole probe allows for underground gas measurements to be made. A short 12" probe is provided as standard. The probe has a built in dust and water filter. Other bar hole probes are sold separately.

Optional Accessories

Bluetooth Module

The Bluetooth Module adds additional flexibility and mobility to the DP-IR by allowing a wireless interface to the instrument. The industry standard Bluetooth communication protocol allows the instrument to stream data to a PDA or PC at distances up to 30 feet (7.6 meters) for data-logging purposes.

28” Bar Hole Probe

This probe is for conducting underground methane concentration measurement at twice the depth of the standard probe provided. The probe is designed to minimize the risk of drawing up water into the instrument.

DC Power Adaptor

An optional DC/DC power adaptor is used to power the DP-IR from a vehicle 12V system. The adaptor isolates and minimizes electronic noise from the vehicle power system, which may interfere with or damage the DP-IR.

Chapter II
Operating the DP-IR

This chapter provides information on the use of the DP-IR. It provides an explanation of working with the menu, external features, setting operational parameters, and enabling functions of the instrument.

Keypad

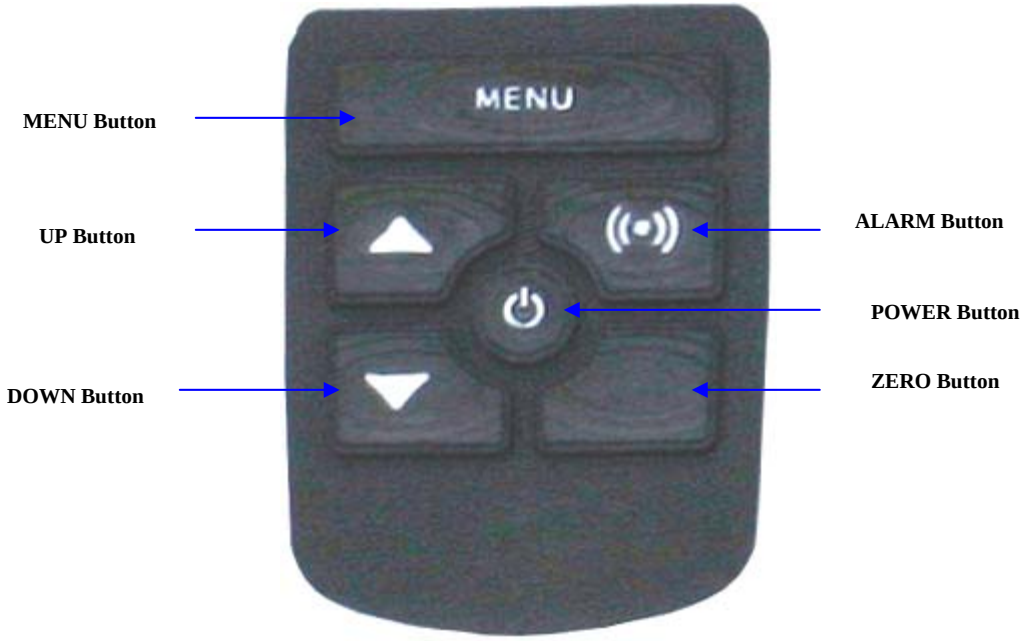

Figure. 3

MENU Button: Scrolls through various instrument settings.
UP Button: Increases a value, acknowledges a user prompt, or selects an option.
DOWN Button: Decreases a value, acknowledges a user prompt, or selects an option.
POWER Button: Depressing for one-second will power on/off the instrument.
ALARM Button: Enables or disables the alarm.
ZERO Button: Performs the Zero operation or activates other features.

User Interface

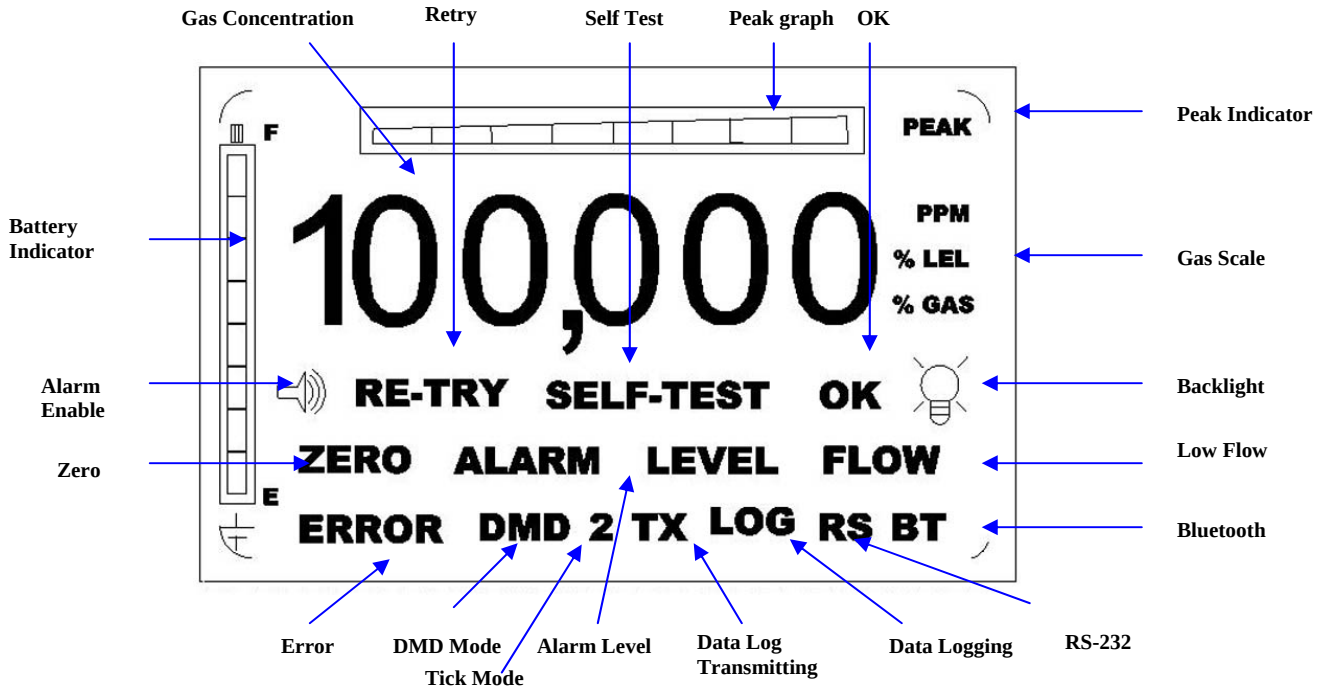

Fig. 5

(Note: for this illustration, all the display icons are shown. During actual operation, only the icons associated with an active function will be displayed)

Alarm Enable: Indicates if the alarm buzzer is activated or not.
Alarm Level: The alarm level has been reached or exceeded.
Backlight: Icon indicating that the backlight is on.
Battery Indicator: Displays the amount of battery charge remaining in 12.5% increments.
Bluetooth: Bluetooth (optional feature) is the active communication link.
Data Logging: The data logging is active.
DMD Mode: The DMD detection mode is on.
Error: A fault condition has occurred; the instrument is no longer functioning properly.
Flow: The intake flow rate is too low.
Gas Concentration: Displays the amount of gas in the selected scale. Over range is indicated by a "1 - - - - ".
Gas Scale: The measurement of gas, taken in either parts per million (ppm) or % gas by volume. Units will auto scale or can be user selected.
OK: The self-test was successfully completed.
Peak Graph: Bar graph showing the relative peak reading from the last 3 seconds.
Re-try: The self-test failed and should be performed again.
RS-232: The RS-232 is the active communication link.
Self-Test: The self-test mode is enabled.
TX: The instrument is transferring data to the DP-IR Data Log program.
Zero: The instrument is being zeroed.

External Features

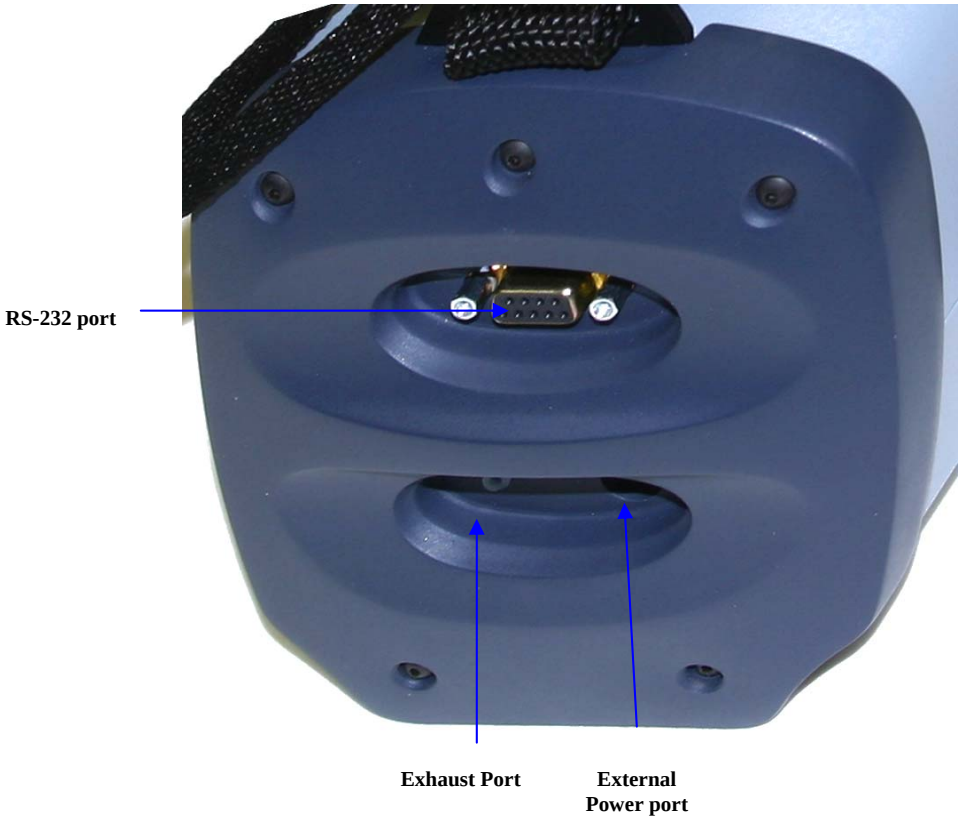

Fig. 6: DP-IR Rear Panel

Exhaust Port: Point where the gas drawn through the sample probe will escape the instrument. Do not block this port.
External Power port: Receptacle for the battery charger plug and external power plug.
RS-232 port: Receptacle for a DB-9 connector for interfacing to a PC using the serial port.

Turning the DP-IR On/Off

Press and hold the POWER Switch located in the center of the keypad for one second. When the unit first turns on, a sequence of displays will be shown briefly to indicate that the instrument is initializing (on ini) and warming up (t◦ ini). A count down will then be displayed to indicate the time remaining until warm up is complete. Depending on temperature conditions, the warm up time is normally under 5 minutes. The following settings will be automatically saved upon shut off and recalled upon start up:

1. Detection mode
2. Alarm Level
3. Bluetooth/RS232 Selection
4. Backlight on/off

Using the Menu

The DP-IR menu allows the operator to adjust certain operational values or to turn on/off additional functions.

The following functions can be turned on/off or enabled:

1. Self-Test
2. Backlight
3. RS232 or Bluetooth COM ports
4. Detection mode

The following Menu screen modes are available:

- Survey – The normal run screen while surveying which shows the gas concentration in real time. The user can Zero and select measurement range from this screen mode.

- Alarm level – The user can set the threshold to which the alarm will sound and can select the detection mode.

- Self-Test – The user can initiate the Self Test routine.

- SEL – The user can turn on or off the backlight and can select RS-232 or Bluetooth communication mode.

Each menu and function is further described in the proceeding sections:

Zero

The background level of methane can be zeroed out through the ZERO button when on the main surveying screen. Zeroing only adjusts the background gas level to read zero:

- It does not calibrate the instrument
- It does not alter the Alarm Level

To perform the Zero, the DP-IR must be at the main surveying screen. Press the ZERO button momentarily until the display reads zero.

Auto/Manual Ranging

The operator can select if the instrument will automatically decide what range to display or, only the selected range will be displayed.

By default on power up, the instrument is in the Auto Ranging mode. The ppm or %Gas icon will be displayed on the right side to indicate the gas range.

To change the ranging mode (Auto/Manual) the DP-IR must be at the survey run screen.

1. Press the Down arrow key once to be in Manual PPM mode.
2. Press the Down arrow key again to be in %Gas mode.
3. Press the Down arrow key to return to Auto Ranging mode.
4. Pressing the Up arrow key will return to the Auto Ranging mode.

Alarm level

The Alarm Level is the gas concentration that will cause the alarm to sound. Set the Alarm Level such that the false alarm rate is low, while not too high that leaks are missed. Your company's survey procedure may require the use of a specific value or procedure to set it.

The Alarm Level can be adjusted in the following steps:

Range (ppm)	Increments (ppm)	Range (ppm)	Increments (ppm)
1-16	1	400-700	50
16-40	2	700-1600	100
40-70	5	4000-7000	500
70-160	10	7000-9000	1000
160-400	20		

To change the Alarm Level:

1. Press the MENU button until the "AL" option is displayed.
2. Press the UP or DOWN button to increase or decrease the threshold. The higher the threshold setting is, the less sensitive the instrument becomes.
3. Press the MENU button to return to the survey run display.

Detection Modes

Two different modes of operation are provided to allow the user the maximum flexibility in using the instrument:

- Digital Methane Detection (DMD): no sound will be made until the Alarm Level is exceeded. A pulsing tone will then sound as long as the Alarm Level is exceeded. The DMD mode is a highly sophisticated detection algorithm that greatly enhances the use of the DP-IR. In most situations, the operator should survey with the DMD mode turned on.
- Tick mode: a ticking sound will be made that is proportional to the instantaneous gas concentration. The higher the gas concentration (up to 1000ppm) the faster the ticking rate becomes. The Tick mode is most effective when used to help isolate the highest gas concentration within a leak area.

To toggle between the DMD and Tick mode,

1. Press the MENU button until the "AL" option is displayed.
2. Press the ZERO button, toggling between DMD and Tick modes.
    a. The DMD icon will be shown when in DMD mode
    b. The 2 icon will be shown when in Tick mode

3. Press the MENU button to return to the survey run screen.

Using the Tick Mode

To aid in pinpointing a leak, the following procedure can be used:

1. Sweep the probe in and around the leak area.
2. Listen for the fastest tick speed.
3. If the location with the fastest tick rate is consistent then the location of the leak is at that spot.
4. If the tick rates are not consistent then keep working the area. The gas plume may be drifting around causing inconsistent readings. In some cases, the gas plume may be large enough that localization is not very accurate.

Self-Test

The DP-IR has a built-in function to perform a self-test and calibration of the instrument. The Self-Test feature should be used on a daily basis to ensure that the instrument is in proper working order. **HEATH** recommends that the self-test function be performed prior to the beginning of your survey day. Each Self-Test should be recorded into a daily log. An example daily log has been included at the end of this manual for your convenience.

To perform the Self-Test, the following procedure should be followed:

1. Remove the instrument from the carrying case.
2. Turn on the instrument and allow it to warm up.
3. Press the MENU button until the SELF-TEST icon is shown on the display (Note: the Retry and OK icon are also displayed).
4. Press the UP button to initiate the Self-Test.
5. If the OK icon is displayed, the instrument passed the Self-Test.
    a. If the RETRY icon is displayed then the instrument failed the Self-Test, press the UP button to retry the Self-Test.
6. Press the MENU button to return to the survey run display.

If the Self-Test fails multiple times, make sure the battery is fully charged and the instrument is properly warmed up.

Caution

Should the instrument not pass after several attempts, do not use the instrument for survey work until the problem is corrected. Contact **HEATH** for further assistance.

Self-test may fail if performed shortly after reading high gas concentrations, (e.g. after bar holing measurement) do to gas still present in the sample cell. Allow the unit to fully purge before running a Self-Test.

Alarm Buzzer

Press the Alarm button to turn on or off the alarm buzzer. When the alarm buzzer is on, the alarm icon is displayed. No alarm icon is displayed when off. To minimize the risk of surveying while the alarm buzzer is off, the alarm buzzer will turn it-self back on in 5 minutes.

Chapter III
Battery/External Power Operation

Rechargeable Battery

****Warning****
Use only a Heath supplied battery in the DP-IR. Failure to do so may cause permanent damage to the instrument.

The DP-IR has a removable, rechargeable Lithium-ion battery that provides the power to the instrument. This battery is designed to provide 8 hours of operating time when fully charged. The display features the remaining battery life remaining with the eight bars indicate the remaining charge in 12.5% increments. This indicator should be used only as a reference. Always start the day with a full charge to ensure a full day's use.

****Note****
To obtain full battery capacity, charge the battery when the ambient temperature is above 50º F (10º C).

****Note****
The DP-IR has built-in battery charging protection, preventing the battery from over charging. The instrument may be powered through external power indefinitely without damaging the battery.

****Note****
Using features such as the Bluetooth, backlight, or operating in cold conditions will decrease the battery life.

****Note****
The instrument as a small but continuous drain on the battery, if left over a long period the battery may be drain down. This will not harm the battery. Recharge the battery as normal.

Battery Charging

Warning
To reduce the risk of ignition of a flammable or explosive atmosphere, batteries must be changed or recharged only in a location known to be non-hazardous.

The DP-IR is provided with a universal AC/DC voltage adaptor. The plug of the adaptor can be changed to fit the type of receptacle used in your location. When the battery charger is first plugged into the External Power jack, verify that there are alternating bars on the Battery Charge Indicator. If not, the charger is not supplying power and the

connection must be verified. When powered through external power, the battery will be charged normally, regardless of the instrument's operational state.

Battery Replacement

To replace the battery:

1. Remove the four screws from the battery compartment door located on the bottom side of the DP-IR.
2. Unfasten the Velcro straps holding the battery in place.
3. Unclip the wire connector between the battery and the instrument.
4. Replace battery with a new **HEATH** approved battery
5. Reconnect the wire connector, fasten straps, and screw down the battery compartment.
6. Dispose of the old battery properly or return it to **HEATH** for disposal.

External Power

The DP-IR has been designed to accommodate mobile surveying from a vehicle. If the operator chooses to do so, they may take advantage of the vehicle's DC power system to run the instrument to provide continuous operation regardless of the battery state. Using the optional DC power adapter, the DP-IR supports 12V DC to 28V DC vehicle power systems. The battery level indication on the display will show alternation bars to indicate a connection to the external power supply. Depending on the supply voltage level of the vehicle battery, the DP-IR battery may also recharge while the instrument is powered through external power.

Chapter IV
Serial Data Communications

Serial Communications Specifications

Interface:	RS-232 serial cable or optional Bluetooth v1.2 Class 2
Connection:	Baud: 38,400 Kbps Data bits: 8 Parity: None Stop bits: 1 No flow control

Refer to the supplemental communications manual (available on request).

Chapter V
Surveying with the DP-IR

****Note****

Refer to your company's specific training and procedures for being qualified for leak surveying and for specific instrument use instructions.

****Warning****

Do not submerge the probe in water. Severe damage may result.

****Note****

The internal pump will always be running. Should there be insufficient flow through the instrument, the FLOW ERROR icon will show and the alarm will sound. To test that the pump is working, plug the inlet with your finger, this will cause a FLOW ERROR and alarm. If there is no FLOW ERROR and alarm, the pump is not working properly.

****Note****

There is always a small amount of methane in the air. This natural methane background is also measured by the DP-IR. The DP-IR is very capable of measuring slight changes in the environmental conditions.

****Note****

When moving the DP-IR from a cold environment to a hot and humid environment quickly, condensation may form on the optics. If this happens, the instrument must remain running for several minutes in order to exhaust this condensation.

Surveying with the DP-IR is similar to surveying with pervious generation FI instruments. To survey with the DP-IR, follow these basic rules:

1) Replace the dust filter at least daily. Severe dusty or wet conditions may require replacement of the filter more often.
2) Recharge the battery after each use to ensure full battery charge for the next day.
3) Perform the Self-Test at least at the start of the survey day.
4) Verify that the Alarm level is set correctly.
5) Verify that the Flow alarm and pump is working correctly
6) Zero the instrument as needed during the survey due to environmental changes.

Chapter VI
Maintenance and Troubleshooting Information

Troubleshooting the Instrument

The advanced design of the DP-IR makes it one of the most reliable leak survey instruments available. However, should you experience problems with the instrument or suspect that the instrument is not operating properly, do not use the instrument for leak survey work until the problem is resolved.

Only a qualified DP-IR repair technician should attempt to repair or open the instrument. There are no user serviceable components in the DP-IR that can be repaired or replaced.

Most often, a problem has a simple cause. The following table provides a list of common problems, causes, and solutions. Should you have a problem not listed or the solution doesn't work, please contact **HEATH** for further assistance.

Symptom	Probable Cause(s)	Solution
Unit will not turn on	▪ Low battery	• Recharge internal battery • Use the External Power Supply
Loss of sensitivity	• Filters need replacing • Alarm Level set too high for conditions	• Check filters and replace if necessary • Zero the instrument in a gas free environment • Lower the Alarm Threshold • Perform Self-Test procedure
Excessive false alarming	• Zero drift • Alarm Level set too low for conditions • Filters need replacing	• Check filters and replace if necessary • Zero the instrument • Raise Alarm Level • Perform Self-Test procedure
ERROR icon and alarm on continuously	• Low battery • Internal component	• Check battery level and recharge if necessary

	failure	• Run Self-Test
FLOW ERROR icon is on	• Filter needs to be changed • Plugged probe	• Check filters and replace if necessary • Clean probe filter and clear or replace the tubing
Very slow to purge out	• Internal Leak	• Check tightness of internal Hydrophobic filter

Maintenance

In order to maintain the DP-IR in good working condition, the following maintenance should be performed as indicated:

Maintenance Item	Frequency
Self-Test and Calibration	Daily to insure that the instrument is functioning properly
Battery recharge	Recharge to full capacity after each use
Replace dust filter	Daily or more often as needed depending on conditions

****Note****

There is a hydrophobic filter inside the battery compartment. Replace this filter should it clog due to dust or water.

****Note****

Do not operate the instrument without the dust filter or without the hydrophobic filter.

Warning

To reduce the risk of ignition of a flammable or explosive atmosphere, batteries must be changed or recharged only in a location known to be non-hazardous.

Caution

Only use Heath Consultants Inc battery pack P/N 102132-0

Chapter VII
Service Information

Warranties and Warranty Repair

The DP-IR is warranted to be free from defects in material and workmanship for one (1) year from date of shipment.

The warranty on authorized repairs in the Houston Factory Service Center (FSC) is ninety (90) days for materials and labor. This repair warranty does not extend any other applicable warranties.

Our warranty covers only failures due to defects in materials or workmanship. It does not cover failure due to damage which occurs in shipment, unless due to improper packing. It does not cover failures, which result from accident, misuse, abuse, neglect, mishandling, misapplication, alteration, modification, or service other than the Houston FSC or other authorized repair center.

HEATH's responsibility is expressly limited to repair or replacement of any defective part, provided the product is returned to **HEATH** FSC or an authorized FSC, shipped pre-paid, and adequately insured. Return shipping and insurance will be at no charge to the purchaser.

HEATH does not assume liability for indirect or consequential damage or loss of any nature in connection with the use of any **HEATH** product.

There are no other warranties expressed, implied, or written except as listed above.

Obtaining Service

To expedite the repair of your instrument, please follow the following procedure:

1. Contact **HEATH** Customer Service at 1-800-HEATH-US to obtain a Return Authorization tracking number. Repairs can be significantly delayed until authorization is obtained.
    a. Specify your complete shipping and billing address.
    b. Specify the person and contact information to be contacted for repair and shipping authorization.
    c. Specify the instrument product name and serial number.
    d. Include a brief description of the problem you are experiencing.
    e. Specify the person and contact information to be contacted for additional information regarding the symptoms of the failure.
2. Package and ship the DP-IR in its original carrying case.

Please specify the tracking number, product name, and serial number on all correspondence.

DP-IR Daily Self-Test and Calibration Log

DP-IR S/N _____

Date	Operator	Passed Self-Test?	Self-Test ppm Reading	Alarm Level	Notes

Declaration of Conformity

Manufacture's Name: Heath Consultants
Manufacture's Address: 9030 Monroe Road
Houston, TX 77061

Model: Detecto Pac - Infrared

Has been demonstrated to be in compliance with the European EMC directive (93/68/EEC), FCC 47 CFR, Part 15, Subpart B, Class A, and ANSI C63.4, and is in accordance with the following standards:

EN 61326-1 A1: 1998 A2: 2000

Date of Issue: February 26, 2007

Signed by: (On File)
Graham Midgley
Heath Consultants CEO

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